



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,298	03/01/2004	Khoi A. Phan	H0266 / AMDP812US	9262

23623 7590 05/10/2006

AMIN & TUROCY, LLP  
1900 EAST 9TH STREET, NATIONAL CITY CENTER  
24TH FLOOR,  
CLEVELAND, OH 44114

EXAMINER

LE, THAO X

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/790,298

Applicant(s)

PHAN ET AL.

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 23-34 is/are pending in the application.
- 4a) Of the above claim(s) 28-31 and 34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 23-27 and 32-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. Newly submitted claim 34 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: claim 34 is a thermoelectric system that both induces heat to and dissipates heat from a region of a semiconductor body and creates a uniform temperature.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 28-31 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 7, 23, 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

-Claim 7 is indefinite because it is lacking of the word "OR" right before "means for dissipating heat" in line 5 and "the region of the semiconductor body" in line 8 is lack of antecedent basis.

Assuming claim 7 would read as "means for inducing heat into a portion of a semiconductor body of the integrated circuit utilizing a thermo-electric structure;

OR a means for dissipating heat away the portion of the semiconductor body of the integrated circuit utilizing a thermo-electric structure; and heat conducting means in contact with the means for inducing heat into or dissipating heat away from the portion of the semiconductor body of the integrated circuit”.

-Claims 23 and 25 recites “the region of the semiconductor body” is lack of antecedent basis.

Assuming the limitation would read as “the portion of the semiconductor body of the integrated circuit”.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-7, 23, 25-26, and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6098408 to Levinson et al.

Regarding claim 1, Levinson discloses in fig. 1-2 and 10 a heat regulating device for regulating a heat flow into and out of an integrated circuit semiconductor body comprising: a thermo-electrical structure 30, column 4 line 47, that induces heat to and/or dissipates generated heat away from a portion of an integrated circuit semiconductor body (a semiconductor wafer would inherently include a IC such as transistor, capacitor, interconnections, etc..), col. 8 line 56, and at least one layer of a

Art Unit: 2814

conductive material 20, col. 4 line 35, in contact with the thermo-electrical structure 30 for conducting heat flow.

Regarding claim 2, Levinson discloses the heat regulating device wherein the thermo-electrical structure 30 is trough within the body of the layer of the conductive material 20, fig. 2.

Regarding claims 3-6, Levinson discloses the heat regulating device further comprising a plurality of the thermo-electrical structures 30 connected form a spreading assembly, fig. 2, wherein the spreading assembly is operatively connected to a heat sink, fig. 10, wherein the thermo-electrical structure 30 is a conductive pathway for heat transfer, wherein the thermo-electrical structure 30 has a structure selected from a group comprising of maze-shaped structure, fig. 2.

Regarding claim 7, Levinson discloses a heat regulating device for regulating a heat flow of an integrated circuit comprising: means 30, fig. 2, for inducing heat into a portion of a semiconductor body of the integrated circuit utilizing a thermo-electric structure 30, fig. 10, or a means for dissipating heat away from the portion of the semiconductor region of a semiconductor body of the integrated circuit (a semiconductor wafer would inherently include IC structure such as transistor, capacitor, interconnection, etc.); and heat conducting means 20 in contact with the means 30 for inducing heat into or dissipating heat away from the portion of the semiconductor body of the integrated circuit.

Regarding claims 23, 25-26, Levinson discloses the heat regulating device with components 42, col. 4 line 54, embedded into the spreading assembly to manage the

heat flow away from and/or into the portion of the semiconductor body of the integrated circuit, fig. 10, wherein the thermo-electrical structure being embedded with measuring device to measure various physical properties of the portion of the semiconductor body of the integrated circuit, fig. 10, wherein the thermo-electrical structure 30 being external element attached to the surface of the heat regulating device, fig. 2.

Regarding claim 32, Levinson discloses a heat regulating device wherein the thermo-electrical structure 30 is a composite, col. 4 line 55, composed of a layer having at least one part tailored to a heat-generating characteristic of a portion of the integrated circuit semiconductor body.

Regarding claim 33, Levinson discloses a heat regulating device at least one thermo-electric structure 30 is integrated with the semiconductor body such that the thermo-electrical structure is positioned in a region of the semiconductor body where a hot spot (IC would generate heat) is anticipated, fig. 10.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6588217 to Ghoshal.

Regarding claim 1, Ghoshal discloses in fig. 3 and 8 a heat regulating device for regulating a heat flow into and out of an integrated circuit semiconductor body comprising: a thermo-electrical structure 838/840, col. 5 line 47, that induces heat to and/or dissipates generated heat away from a portion of an integrated circuit semiconductor body, see abstract, and at least one layer of a conductive material 834, col. 5 line 53, in contact with the thermo-electrical structure 838 for conducting heat flow.

Regarding claim 2, Ghoshal discloses the heat regulating device wherein the thermo-electrical structure 838 is trough within the body of the layer of the conductive material 834, fig. 8.

Regarding claims 3-6, Ghoshal discloses the heat regulating device further comprising a plurality of the thermo-electrical structures 838 connected form a spreading assembly, fig. 8, wherein the spreading assembly is operatively connected to a heat sink 830, fig. 8, wherein the thermo-electrical structure 838 is a conductive pathway for heat transfer, wherein the thermo-electrical structure 838 has a structure selected from a group comprising of maze-shaped structure, fig. 4.

Regarding claim 7, Ghoshal discloses a heat regulating device for regulating a heat flow of an integrated circuit comprising: means 838, fig. 8, for inducing heat into a portion of a semiconductor body of the integrated circuit, see abstract, utilizing a thermo-electric structure 838 or a means for dissipating heat away from the portion of the semiconductor region of a semiconductor body of the integrated circuit; and heat conducting means 834 in contact with the means 838 for inducing heat into or

dissipating heat away from the portion of the semiconductor body of the integrated circuit.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6098408 to Levinson et al. in view of US 6729383 to Cannell et al.

Regarding claim 24, Levinson does not disclose a heat regulating device wherein the thermo-electrical structure having a denser distribution of line patterns towards the center of the structure and a less dense distribution of lines towards the outer limits of the structure.



However, Cannel a heat dissipating structure can be formed in various arrangements, col. 2 lines 49-57. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of Cannell with Levinson as claimed, because it would have either increased or decreased the heat transfer surface for intended used.

11. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6098408 to Levinson et al. in view of US 6105381 to Ghoshal.

Regarding claim 27, Levinson does disclose a heat regulating device fabricated from a combination of various layers of ceramic 48, col. 4 line 58.

But Levinson does not disclose a heat regulating device fabricated from a combination of various layers of silicon carbide and diamond.

However, Ghoshal discloses a thermo electro deice 454 connects to a diamond, col. 5 lines 38-40. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to replace the ceramic material of Levinson with the diamond layer teaching of Ghoshal, because it would have created a high thermal conductivity material as taught by Ghoshal, col. 5 line 40.

### ***Response to Arguments***

12. Applicant's arguments filed 28 Mar. 2006 have been fully considered but they are not persuasive. The Applicant argues that Levinson does not disclose an integrated circuit semiconductor boy. This is not persuasive because Levinson thermoelectric structure can be used to regulate temperature of at least a portion of the wafer, fig. 10 col. 3 line 15. It is well established in the art that the terms "wafer", "substrate",

“semiconductor substrate”, or “silicon wafer” often refer to the same thing. Such substrate is being used to fabricate integrated circuit (IC), as evidence in Speciale (2006/0054091) [0002]; thus the wafer as disclosed by Levinson would inherently include a semiconductor body and IC.

### ***Conclusion***

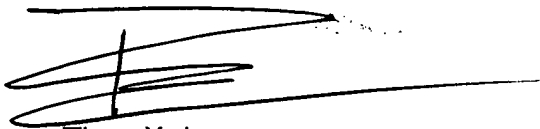
13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Thao X. Le', with a long horizontal stroke extending to the right.

Thao X. Le  
30 April 2006